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NPIC/D-115-84

MEMORANDUM FOR: Deputy Director of Central Intelligence

VIA : Assistant Deputy Director (Intelligence)

SUBJECT : Research and Development Project Approval Request for Development of Two Groups of Three Prototype Light Tables

REFERENCE : DDCI Memorandum LR 63-33121, dated 23 December 1963: Approval of Research and Development Activities

1. In compliance with paragraph 4.b. of the reference, approval is requested for development of two groups of three prototype light tables [redacted] outlined in Annex "A".

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CONCUR:

[redacted]

Paul A. Morel
Assistant Deputy Director (Intelligence)
for Management

25 Aug 64
Date

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APPROVED:

[redacted]

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Date

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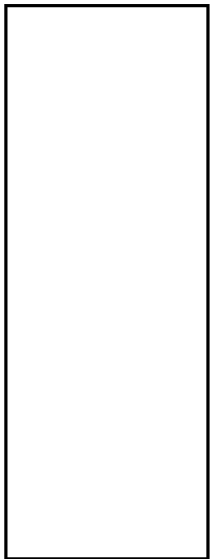


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I. Identification

The National Photographic Interpretation Center proposes the development of two groups of three prototype light tables for use in film viewing operations. These tables, of three different configurations, are designed as superior replacements for similar types of equipment presently in operational use. The project will be conducted as a parallel development effort [REDACTED]

[REDACTED] Although the project was originally incorporated in the Third Quarterly Review of FY-64 Development Program, budgetary consideration dictated that it be programmed for Fiscal Year 1965 under Category II "Viewing and Photo Interpretation Equipment."

II. Objectives

The results of this development will be six prototype advanced-concept, film-viewing light tables -- three different tables developed by each manufacturer. The three types are: (1) An 11" x 18" format tilt-top unit, (2) an 11" x 40" format unit with translating microscope carriage and (3) an 11" x 40" unit with translating microscope carriage and integral tracking high-intensity light sources.

This project should result in sophisticated (but reliable) prototype light tables, built with proper attention to human engineering, and which are to be evaluated under actual operational conditions by photo interpreters. The desired final product of this development program would be prototypes which could be further refined and then manufactured on a production basis to replace current operational models.

III. Background

The present 9" x 18" format "tilt-top" and 9" x 40" "motion-carriage" light tables are two of the most heavily used pieces of equipment not only at NPIC but also throughout the Intelligence Community. These units, while functional, are generally awkward and uncomfortable to use because they require the viewer to sit in an unnatural position and have controls which require uncomfortable hand or arm movements. The current "tilt-top" table, when tilted, requires cranking with the right or left hand in a position approximately three inches above the head -- an extremely fatiguing position after a few hours of steady work. In addition, it is difficult to load and has poor stability (balance) while the film is being cranked; furthermore, the light source does not provide adequate light intensity and is subject to "flickering" when dimmed for use with low density film positives.

The 9" x 40" motion carriage unit has many of the same disadvantages as well as some additional problems. The stereomicroscope is mounted upon a motion carriage which is designed in such a manner that it is difficult, if not impossible for the operator to sit comfortably and uprightly on a chair, while looking through the stereomicroscope. The operator is forced into a backstraining position. In addition, the hand wheels required for transporting the film are not conveniently located. Human engineering was not thoroughly considered in the design of this equipment.

All of these features introduce high fatigue factors and inefficiency into the photo interpretation operation. Since the highly skilled photo interpreter is the most important single element in the P. I. process, equipment which has not been engineered for maximum efficiency and comfort creates penalties we cannot afford. Two of the proposed prototype table-types are units designed to replace present equipment. The third table is designed in anticipation of solving future problems. As the resolution of film materials increases, they must be viewed with higher and higher magnifications; consequently, there is a point at which general diffused illumination from the light table becomes inadequate and high-intensity light sources are required. Since the microscope translates, these high intensity sources must track the objective lenses. The third table-type is designed to accomplish this.

IV. Technical Specifications

A. Advanced Tilt-Top Light Table

The units to be built by both contractors will provide the following advanced features:

1. Handling (up to) 500' single rolls of $9\frac{1}{2}$ ", 5" or 70 mm film, or dual rolls of 5" or 70 mm film concurrently.
2. Increased illumination up to 1800 foot lamberts, continuously variable from 15% to 100% of full intensity, without visible evidence of "flicker".
3. Adjustable sub-stage shades to block out all of the illuminated surface not actually covered by film.
4. A unique, completely reliable film drive that will permit bi-directional film motion and controllable from either end: i. e., it will permit both winding and unwinding with the same crank at one end of the table. In addition, the drive will incorporate

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a two-speed feature to facilitate high-speed slewing [] system is a purely mechanical system which is very desirable from the reliability standpoint [] uses an electro-mechanical approach.)

5. Fast, positive loading and unloading mechanisms.
6. A film transport mechanism that maintains a light, constant tension to keep the film flat and in contact with the glass surface. This tension is automatically eased when the film is transported. The contractors have different approaches to this problem.
7. Tilt mechanisms that permit tilts of (up to) 75° on one axis and 45° on the other.

B. Advanced Film-Viewing Light Table with a Translating Microscope Carriage.

For these, both contractors will incorporate all of the tilt-top unit except for item A7. In addition, the following features will be added:

1. An 11" x 40" illuminated area vice 11" x 18".
2. A height adjustment of 3" and a tilt adjustment 0° through 15° .
3. An advanced, precision carriage for translating microstereoscopes or stereomicroscopes in both X and Y over an area of 10" by 35" of the total illuminated format. Adapters are provided for mounting the [] microscope.
4. A fine micrometer X-and Y-microscope motion over + 2cm in travel, which can be implemented once the main translational carriages have been locked in position. This precision motion is graduated and accurate to .001 mm plus .01% of the total distance being measured.

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C. Advanced Film-Viewing Light Table with Translating Microscope Carriage and High-Intensity Tracking Light Source.

This unit is basically the same as Item B above, with the following exception:

1. Two high-intensity, condenser-type light sources are provided which are positioned between the general illumination source and the surface glass plate and are independently adjustable so that they can be adjusted beneath the objective lenses of the microscope. When the microscope and microscope carriage are translated, the high-intensity light sources will track the objectives [redacted] proposes a unique fiber-optic system with magnetic or mechanical tracking linkages [redacted] proposes a mechanical mirror system for positioning (by means of reflection) externally-mounted condenser sources.

V. Contract and Financial Arrangements

This project will be accomplished under two parallel contracts:

- A. A two-phase [redacted] CPFF or CPIF contract [redacted] [redacted] for a feasibility study, development and fabrication of three prototype, advanced design, film-viewing light tables. The feasibility study would cost [redacted] and the construction of three prototype instruments an additional [redacted] for the total cost [redacted] Should the feasibility study prove unrewarding, the contract would be terminated at the end of Phase I at a cost [redacted]

- B. A [redacted] fixed price effort [redacted] for the design and fabrication of three additional prototype [redacted] did not propose or bid on a Study phase).

Delivery of the three [redacted] prototype units is scheduled for ten(10) months from the actual award of contract while delivery of the [redacted] units is programmed for seven (7) months from award of contract.

Development of proposals were solicited from a total of 16 companies [redacted] the only companies bidding [redacted] proposal was considered technically quite superior to the other two [redacted] proposal was reasonably good while [redacted] was considered unacceptable.

The [redacted] proposals are superior for the following reasons:

1. The drive system is purely mechanical -- an extremely important factor where reliability is concerned. We cannot afford unreliable equipment.

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2. The [] proposals were technically very thorough and complete: All of the problem areas had been recognized and feasible solutions offered.

3. Their approach to the overall design is highly desirable from the standpoint of mechanical simplicity and human engineering.

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4. Past developments undertaken [] indicated that they have the engineering and mechanical capacity to design and implement the desired drive and film-tension mechanisms.

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5. Two of the prototype units require measuring stages: [] specializes in this type of equipment.

Because of the importance of the items being developed, and because of the high degree of sophistication required of the film drive and film-tension mechanisms, it is technologically prudent to undertake a parallel development.

By undertaking a parallel development, we obtain two totally different approaches in design philosophy. The best designs, of both components or subsystems, from either manufacturers, would then be included on the production units at the time of manufacture with a real opportunity of cutting down the standard R&D lead time.

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[] is suggested for parallel support because:

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a. their relatively low cost, fixed-price proposal -- though not as technically superior or quite as feasible as the [] proposal -- would provide at reasonable cost insurance toward obtaining successful tables within a reasonable time span.

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b. They had a basically good proposal and proposed a film loading system that could prove quite superior to the system envisioned []

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c. There was little duplication between the two design concepts.

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d. [] currently building a light table of their own design. This background should be quite helpful on our contract. P&DS knows from prior experience [] is a reliable and competent contractor.

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This parallel contract would provide an additional advantage of developing another potential supplier of equipment of this type. Competition is badly needed in this field. Even though the basic units are quite different in configuration and operation, there is significant overlap in the design of the light table components -- such as, the film holding mechanism and the sophisticated drive system. Consequently, there are considerable monetary savings in negotiating all three types of tables as a package with one manufacturer. Dividing the package between manufacturers was considered but would actually have resulted in increased costs or fewer prototypes per given cost.

Although [] bid on a CPTF basis it appears that this contract might be negotiated CPTF. If an incentive-type contract can be negotiated, P&DS will provide the Office of Logistics with appropriate technological incentive criteria.

VI. Coordination

The proposed development has been coordinated with representatives of both PID and PAG. The best of numerous suggestions, gathered from many different NPIC analysts, were incorporated into the Development Objectives upon which this project was based and are reflected in the contractor's technical proposals. By virtue of contacts throughout industry and the intelligence community it is concluded that no equivalent devices are currently in existence.